

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Status of the Claims

Claims 1, 4, 11, 15 and 19 are amended according to subject matter recited in the Original Specification, for example, at page 24, line 2, page 25, line 10. New claims 21 and 22 are added according to subject matter recited in the Original Specification, for example, at page 38, lines 4-5. Thus no new matter is added.

Claim rejection under 35 U.S.C. 103

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being obvious over Li et al. (U.S. Patent No. 6,555,503; hereinafter Li). This rejection is respectfully traversed.

The Office Action dated May 29, 2009 fails to establish a prima facie case of obviousness. The Office Action admits that the Li fails to provide a working example with a sintering density of at least 93% per the claims 1, 4 and 11. (Page 3, lines 12-13) Instead Li discloses “a large reduction rolling operation on this scale produce oxide precursor tapes having about 90% density.” (Li, column 14, lines 48-50) Li fails to disclose a sintering density, much less a sintering density of at least 93%.

Nonetheless, the Office Action asserts that Li discloses a density of about 90% that would touch or lie close to the instant claimed range of at least 93%. About 90% is not at least 93%. Furthermore, the art of record teaches that an increase in sintering density beyond 90% is challenging to achieve as discussed in Li. Contrary to the teachings of the art of record, the present applicant recognized that using a higher pressure during heat treatment can increase the sintering density instead of lowering the sintering density. The increase in sintering density allow the oxide superconductor to realize an increase in critical current, and an increase in sintering density can reduce in the number and size of gaps between oxide superconducting crystals which in turn may reduce ballooning and damage to the oxide superconductor. (Original Specification, page 1, line 20 to page 2, line 2) Moreover, dependent claims 2-3, 5-6 and 12-13 recite higher sintering densities of at least 95% and at least 99% that fall outside the about 90% range of Li.

In the Office Action of May 29, 2009, the office action argues that the prior art teaches making an article with a density of greater than 90%. (Page 3, lines 23-24) However, the greater than 90% density in Li refers to a highly textured precursor that is then heated under “one atmosphere of pressure where the oxide phase expands (dilates) and experiences a decrease in both density and degree of texture.” (Li, column 10, lines 6-16) Therefore, Li expressly teaches that the density decreases during heat treatment. Accordingly, Li fails to teach or suggest at least a sintering density of 90%.

In addition, the cited reference and other references do not teach or suggest the present invention, because of unexpected properties available in the range claimed and that the prior art materially taught away from the claimed invention.¹

Claim 1 and 4 recites among other features, the oxide superconductor wire has a thickness that has been reduced by heat treatment performed under a pressurized atmosphere having the pressure of at least 1 MPa and less than 50 MPa and the oxide superconductor exhibiting sintering density of at least 93 %. The pressurized atmosphere having a pressure of at least 1 MPa and less than 50 MPa, results in the thickness of the superconducting wire being reduced after heat treatment relative to its thickness before heat treatment. A reduced thickness of the oxide superconductor leads to an increase in density.

However, the art in material respect teaches away from an increase in the density after a heat treatment. In particular, composites tend to swell during heat treatment. (J. Jiang et al., Though-process study of factors controlling the critical current density of Ag-sheathed $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{CuO}_x$, 14 Supercond. Sci. Technol. 548-556 (2001); hereinafter Jiang, page 549, column 1, lines 18-19) The swelling of the composites may lead to a reduction in density such as, relative density of the oxide core in high- J_c tapes can change from 95% before heat treatment to 81% after heat treatment and it decreased from 76% before HT to 65% after HT for Ag-sheathed monocoire tape. (Jiang pg. 549, column 1, lines 23-29)

Similarly, Li discloses the tape thickness after the heat treatment increases as compared with the thickness after the rolling (See. tables 1-5). Li discloses that the article shows increases in thickness of less than 7%, less than 6%, and preferably in the range of 1-5%. (See. Column 13, lines 40-45). Since there is an increase in size, the density of the tape

¹ *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (C.C.P.A. 1974).

after the heat treatment is lower than that after the rolling. Accordingly, the specific value of the pressure recited in claims 1, 4 and 11 during the heat treatment leads to unexpected result of increasing the density to at least 93% after heat treatment. Therefore, claims 1, 4 and 11 are believed to be allowable.

Claim 11 as amended recites among other features, heat treating the oxide superconducting wire under a pressurized atmosphere having the pressure of at least 1 MPa and less than 50 MPa, and wherein the heat treatment provides the oxide superconductor with a sintering density of at least 93%. Li fails to teach or suggest at least the above recited features of claim 11.

Instead, Li teaches heat treatment using one atmosphere of pressure or lower, for example, column 5, line 42, column 9, lines 30-31, and column 10, line 14. Moreover, Li fails to teach reaching at least 93% sintering density. Therefore, claim 11 is believed to be allowable.

Claims 15 and 19 are amended to recite, a heat treating is performed under a pressurized atmosphere having the pressure of at least 10 MPa. As discussed above Li fails to teach or suggest at least the above recited feature. Therefore claims 15 and 19 are believed to be allowable.

Therefore claims 1, 4 and 11 are believed to be allowable. Because claims 2, 3, 7, 8, 14, 15, and 16 depend directly or indirectly from claim 1, they are believed to be allowable. Because claims 5, 6, 9, 10, 17 and 18 depend directly or indirectly from claim 4, they are believed to be allowable. Because claims 12, 13, 19 and 20 depend directly or indirectly from claim 11, they are believed to be allowable.

New Claim

New claims 21 and 22 are added to further protect aspects of the present invention. Accordingly, new claims 21 and 22 is patentably distinguishable over the references of record, at least for reasons as discussed above with respect to claims 1 and 4. In addition each new claims 21 and 22 are further distinguished from the references of record.

For example, new claim 21 is dependent on claim 1, and incorporate every feature of claim 1 and further recites, wherein the sintering density of at least 93% is greater than the

density of the oxide superconductor wire prior to performing heat treatment under the pressurized atmosphere. None of the cited references, alone or in combination, teach or suggest, wherein the sintering density of at least 93% is greater than the density of the oxide superconductor wire prior to performing heat treatment under the pressurized atmosphere. Instead, Li teaches that the density of the superconductor wire prior to heat treatment will be lower than the density before heat treatment. Therefore claim 21 is believed to be allowable.

For example, new claim 22 is dependent on claim 4, and incorporate every feature of claim 4 and further recites, wherein the oxide superconductor wire is composed of a material that has a first density prior to the heat treatment and wherein the first density is less than the sintering density after the heat treatment. None of the cited references, alone or in combination, teach or suggest, wherein the oxide superconductor wire is composed of a material that has a first density prior to the heat treatment and wherein the first density is less than the sintering density after the heat treatment. Instead, Li teaches that the density of the superconductor wire prior to heat treatment will be higher than the density after heat treatment. Therefore claim 22 is believed to be allowable.

Concluding Remarks

After amending the claims as set forth above, claims 1-22 are pending in this application.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under

37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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